

Having thus described my invention, I now claim:

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1. A method for identifying orientation in free space of a
5 preselected object, from a projected image of the object in a view plane of a video
camera, comprising steps of:
detecting the object from the image by recognizing relative positions of
points on the object's image within the view plane;
calculating corresponding coordinate positions of the points at an
10 object position in free space based upon the relative positions and known camera
geometric dimensions; and,
converting the coordinate positions into the location of the object.
2. The method of claim 1 wherein the points on the object's image
15 are three preselected co-linear points.
3. The method of claim 1 wherein the object comprises an
alignment indicator.
- 20 4. The method as defined in claim 1 wherein the converting
comprises identifying a location and pointing direction of the object in the free space.
5. The method as defined in claim 1 wherein the preselected
object comprises a wand for communicating a pointing direction in an augmented-
25 reality display system, the detecting comprising detecting pixel location on the view
plane of beads on the wand corresponding to the points.
6. The method as defined in claim 5 wherein the beads comprise a
predetermined color and the detecting includes detecting the pixel locations
30 representing a property of the color.
7. The method as defined in claim 6 wherein the color property is
at least hue.

8. The method as defined in claim 5 wherein the detecting includes finding a center pixel location of each of the beads.

9. The method as defined in claim 1 wherein the known camera geometric dimensions comprise a given distance between a view point and a view plane of the camera, and the calculating comprises converting the relative positions of the points based on the given distance and the known spacing of the points, to an object distance in the free space between the predetermined object and the view plane.

10. A method for determining a location of a wand in a preselected free space from a video image of the wand, wherein the wand comprises three equidistantly-spaced, co-linear beads, comprising steps of:

capturing the video image of the wand on a view plane of a video camera system wherein the image is represented by a frame memory including relative positions of the beads;

determining centers of the beads on the view plane and relative spacings between the centers; and,

calculating coordinate positions of the beads in the free space based upon the relative spacings and known camera system geometries of generating the video image.

11. The method as claimed in claim 10 wherein the wand includes an alignment indicator and the calculating includes determining a pointing direction of the wand from the alignment indicator and the coordinate positions of the beads.

12. The method as claimed in claim 11 wherein the beads comprise a distinctive indicia from a background setting of the video image and the determining includes recognizing the distinctive indicia.

13. The method as claimed in claim 10 wherein the calculating comprises unprojecting the video image and verifying that the coordinate positions are reasonable representations of the wand in the free space.

5 comprising:

a processor for detecting relative positions of the indicia in a view

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